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**Northern Territory Government
Submission**

to the

House of Representative's inquiry

into

***Climate Change and Environmental
Impacts on Coastal Communities***

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1. Introduction

The coastal zone is one of Australia's greatest assets, providing unique values and resources to the Australian way of life. The capacity to ensure ecologically sustainable use and development of the coastal zone is an imperative for all Australians. The Northern Territory (NT) possesses over 7 200 km of coastline and 71 839 km² of its waters lay entirely within the monsoon tropics. Further, it possesses 398 islands and more than one million hectares of wetland. Indigenous Territorians hold title to approximately 84 per cent of the NT's coastline; have strong cultural ties to the sea, a well developed system of traditional custodianship and spiritual connections with numerous sites and species of marine fauna and flora. This submission will deal with two interdependent threats to coastal environments: climate change and population expansion.

The significant concentration of Australia's population within 50 km of the coast (approximately 80 per cent) has exposed greater numbers of people, wealth and infrastructure to extreme coastal weather events. These socioeconomic trends are projected to continue for at least the next half century, and thus Australia's vulnerability to extreme events will continue to increase. Moreover, any environmental ramifications caused by population expansion on the coast are likely to be exacerbated by climatic changes.

According to the Australian Bureau of Statistics (ABS),¹ the population of the Northern Territory is approximately 218 000, comprising only 1.04% of the Australian total. On the coast, the two largest population centres are Darwin (117 000) and Nhulunbuy (3 700). Alyangula on Groote Eylandt has a population of 1 200, but other coastal settlements are small (200 - 300 people) and relatively isolated (refer to Northern Territory Coastal Communities map in Attachment C). Most of the Northern Territory coastline is therefore largely unpopulated, and remains remote and often inaccessible during the wet season because there are relatively few sealed roads and floodwaters cover large areas during the wet season. As a consequence, many coastal areas in the NT are accessible only by air or boat. Much of the Indigenous land in particular is remote and difficult to access.

¹ Australian Bureau of Statistics (4 Sep. 2008) *Population Projections Australia*, <http://www.abs.gov.au/Ausstats/abs@.nsf/mf/3222.0>.

While coastal and marine environments in the Northern Territory are relatively pristine, increased anthropogenic activities on a local and regional scale (and also, from activities in international waters) now threaten several habitats and species. Also of concern to the Northern Territory are the predicted changes in climatic patterns to coastal areas, including an increase in average rainfall, intensification of storms and cyclones and a rise in both temperature and sea levels.² These changes are expected to affect both the physical and biological conditions of the coastal zone. In turn, changes to these conditions are likely to have significant cultural, social and economic ramifications, particularly to coastal settlements, industries and indigenous and non indigenous communities.

This submission will suggest that to ameliorate the impacts of climate change in coastal areas, what is critically needed is a national approach to coastal marine climate change research, monitoring and data management. This includes national data, monitoring and reporting systems and the development of bioregional coastal adaptation strategies and plans. Significantly, in the Northern Territory, these adaptation plans need to recognise the inalienable tenure, rights and interests of coastal, Indigenous communities - and build on current 'Sea Country' monitoring, planning and management programs and activities.

The Commonwealth Government should facilitate a strategic approach to identify and address the national and regional gaps in research knowledge and develop monitoring and data management systems so as to improve and sustain coastal zone management in the face of climate change. Currently, there are limited mechanisms to assist or encourage information sharing, which is exacerbated by the competitive nature of national research funding and the co-investment business model to national research investment.

There is a further need to develop broader scale and cost effective monitoring tools such as remote sensing (particularly in remote regions) and a necessity to expand the focus of current climate change research from demographic and infrastructural sectors to incorporate the bio-economic impacts and the effects of climate change and major catastrophic events on biodiversity, including predictive scenario modelling.

² K. Hennessy et. al. *Climate Change in the Northern Territory* (Climate Impact Group, CSIRO Atmospheric Research, 2004).

The resulting research needs to be added to existing data via a consistent mechanism for data sharing amongst researchers, government agencies and communities (including Indigenous) across Australia to develop a coordinated approach to dealing with the challenges that climate change presents for the Australian coastline.

2. Details of the Inquiry

On 20 March 2008 the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts were asked to inquire in and report on climate change and environmental impacts on coastal communities.

The Northern Territory Government was invited to make a submission.

The Terms of Reference to the inquiry are:

- existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum
- the environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources
- the impact of climate change on coastal areas and strategies to deal with climate change adaptation, particularly in response to projected sea level rise
- mechanisms to promote sustainable coastal communities and
- governance and institutional arrangements for the coastal zone.

3. Existing policies and programs related to coastal zone management, taking in the catchment-coast-ocean continuum

The Northern Territory (NT) Government has an integrated framework for coastal planning and management across relevant government agencies, but it does not possess a specific legislative base to establish the policy roles and responsibilities of government in the coastal zone.

The NT *Planning Act* provides for a single integrated NT Planning Scheme, with the Minister for Planning and Lands holding responsibility. Any proposed development of land subject to storm surge and coastal landfill must meet the standards set under Clauses 6.14 and 6.15 of the NT Planning Scheme; which specify that residential and community services developments should be avoided in the 'Primary' and 'Secondary' storm surge area.

The NT Government, Department of Natural Resources, Environment, the Arts and Sport (NRETAS; www.nt.gov.au/nretas) has the core responsibility for managing the Territory's environment, including coastal, and marine environments, estuaries and their catchments. The NT Government Department of Regional Development, Primary Industry, Fisheries and Resources (DRDPPIFR), manages the Territory's fishing resources, including, commercial and recreational fisheries, aquaculture, aquatic pests, and fisheries research and monitoring (see: www.fisheries.nt.gov.au). DRDPPIFR has an Aquatic Pest Management Unit that monitors waters in Darwin marinas, selected sites in the greater Darwin Harbour area and around Nhulunbuy to detect the presence of aquatic pests.

The Northern Territory Coastal Management Policy, initially developed in 1985 and under internal review since 2001, currently provides a level of jurisdictional cohesion and direction in coastal and marine management, but given the inherent limitations of non-statutory policies, other complementary management mechanisms are also required. To this end, several coastal marine policies and strategies are currently being finalised by NRETAS which will assist with sustainable coastal planning and management in the NT. This includes the development of an '*NT Coastal, Estuarine and Marine Biodiversity Strategy and Action Plan*' that will provide a policy framework and priority actions for

coastal biodiversity management in the NT, including the development of coastal marine bio-regional plans. Under a proposed Northern Territory Coastal and Marine Planning Framework, the Interim Marine and Coastal Regionalisation of Australia (IMCRA) bioregions will be used as a basis for the establishment of Bioregional Management Plans (BMPs).

In addition, the Northern Territory Government is currently finalising a monitoring and reporting framework for coastal, estuarine and marine ecosystems, as part of Natural Resource Management (NRM) and State of the Environment reporting. This program builds on national efforts, coordinated by the Intergovernmental Coastal Advisory Group (ICAG) and undertaken by the former National Land and Water Resources Audit (NLWRA) – including the identification of indicators and an ecosystem based and stressor based approach to monitoring and reporting of coastal and marine assets.

The policy framework for management of coastal environments in the Northern Territory is also consistent with national policy and planning. This includes the *National Oceans Policy* (through strategies such as the *National Strategy for an Ecologically Sustainable Development* 1992 and the *National Strategy for the Conservation of Australia's Biological Diversity* 1996). A core component of the Oceans Policy, 'Regional Marine Planning', has recently been incorporated under the *Environment Protection and Biodiversity Conservation Act* 1999 (Cth), and the *Northern Marine Bioregional Plan* is currently being finalised.

The Northern Territory is also bound by Australia's international responsibilities and obligations under various agreements, treaties and conventions (these may be found in Attachment A). Under the *Convention on Biological Diversity* (United Nations Environmental Programme, 1992) signatory governments are required to develop national biodiversity strategies and action plans and to integrate these into broader national plans for environment and development. These obligations are implemented at a national level and at the state / territory level under the *Intergovernmental Agreement on the Environment* (1992).

Current coastal programs in the NT are largely limited to Darwin Harbour and major population centres (i.e. Nhulunbuy) and are documented in a range of publications, including the *Integrated Natural Resource Management Plan of the NT* (2005). Overall,

Territory wide coastal research and monitoring programs are limited. There is very little research and monitoring occurring outside of the Darwin Harbour region and areas subject to mining (e.g. Nhulunbuy, Alligator Rivers region). National Geographic Information Systems (2004) highlighted that there is a deficiency of water quality information for NT coasts and estuaries.

There is no overarching legislation (and no single coordinating agency) for coastal and marine planning and management, or integrated catchment management in the NT.

Apart from Darwin Harbour, there is no coastal or catchment management authorities in the NT or regionally based groups with the formal responsibility for overseeing the management of particular coasts, estuaries or their catchments. Catchment advisory groups have been established under the *Water Act* but are largely only active for the purposes of public consultation and developing management plans. There are also consultative forums involving government, industry, Indigenous, and recreational representatives for fisheries management, aquaculture, marine pests, and environmental plans for mines (Land Council of the Northern Territory, 2005).

Within Darwin Harbour, the Darwin Harbour Advisory Committee oversees the implementation of the Darwin Harbour Regional Plan of Management (released in 2003) and provides a community based sounding board on issues relevant to the Darwin Harbour region. Included in the plan is the aim to conduct research and monitoring to improve the knowledge and understanding of the region's environment.

While there are no coastal management bodies or authorities in the NT, Indigenous communities such as Yolngu and Yanuywar have recently undertaken 'Sea Country' planning to identify management issues and strategies to support land and sea conservation and sustainable use, and to identify regional economic development and employment opportunities. These 'Sea Country' plans include coastal environments and estuaries. These plans, if adequately resourced, supported and integrated with government programmes, provide an avenue and exciting opportunity to implement integrated coastal management on indigenous land, and in the remote regions of the NT.

The *Caring for Sea Country Program* developed by the Northern Land Council aims to increase the capacity of local Indigenous communities to be involved in coastal and marine natural resource management (LCNT, 2005). The program involves assisting communities with planning and managing their sea country through workshops, ranger programs, research projects, and assisting with accessing funding. Ranger programs with sea management capacity have been created around the coast (including in Tiwi Islands, Wadeye, Borroloola and Maningrida) and there is high demand amongst Indigenous people for more of these programs. There are also now over 30 Indigenous community based land and sea management agencies in the NT.

Such programs and communities, if supported appropriately and resourced adequately could provide a very effective avenue for sustainable managing, monitoring and conserving the remote and often inaccessible coastal regions of the NT.

4. The environmental impacts of coastal population growth and mechanisms to promote sustainable use of coastal resources

Ninety percent of coastal waterways in the Northern Territory (NT) were classified as near pristine during the National Land and Water Resources Audit (NLWRA 2002). This is a far higher percentage than any other state or territory, and much higher than the national percentage (of 50 percent). The near pristine coastal waterways in the NT span the full range of estuary sizes, from numerous small tidal creeks (generally less than 12 km²), through moderately sized tide dominated estuaries (100 - 200 km²) such as the East Alligator, Bynoe and Keep River estuaries, to the very large systems such as the Victoria River tide dominated estuary (638 km²) and the Arnhem Bay embayment (1124 km²). The large number of apparently *near pristine* estuaries in the NT reflects the small size of the population and the relatively good quality of the catchments.

Based on the *2006 Census Usual Residence Count* for tropical river catchment areas (custom geography defined by Charles Darwin University and based on combinations of Collection Districts and Statistical Local Areas), the total population of NT catchments excluding the Darwin area was 47 647. However, according to Australian Bureau of Statistics population projections,³ by 2056 Darwin's population is projected to double in size to 243 000 people. This poses environmental concerns as the population boom and associated augmentation in coastal use will likely increase stress on the surrounding coastal environment. The Territory's coastal and estuarine ecosystems support critical ecological links for many marine biotas. As with similar environments, the NT coastal and marine environment is susceptible to land based input from coastal and catchment development.

Impacts include habitat removal, increasing nutrient, sediment and pollutant loads and introduction of terrestrial and marine pests. Currently, the relatively low levels of industrial infrastructure and maritime activity, in combination with the large, semidiurnal tidal range suggest the low levels of anthropogenic contaminants entering the waters of Darwin harbour are subject to a rapid and substantial dilution. Ambient water quality surveys of

³ Australian Bureau of Statistics (4 Sep. 2008) *Population Projections Australia*, <http://www.abs.gov.au/Ausstats/abs@.nsf/mf/3222.0>.

Darwin Harbour have consistently reported low levels of heavy metals, pesticides, polychlorinated biphenyls (PCBs) and hydrocarbons.⁴

An increase in population in specific coastal areas of the Northern Territory is likely to cause augmented coastal and marine pollution. Pollution may impact directly upon organisms, causing mortality, stress or reproductive impairment, either immediately or through cumulative effects. Secondly, greater coastal developments pose significant issues to the Territory's corals. The Arafura and Timor Seas are major shipping routes and corals may be affected by oil spills and groundings. Coastal development may further affect coral communities through increased sediment and pollution entering the marine environment.

Finally, potential impacts from fisheries including commercial, recreational and Indigenous can be through direct mortality (over harvesting of target species), indirect mortality (accidental catch of threatened species and by catch) and habitat degradation. In many instances, little research has been undertaken on the impacts of such effects on fish populations, food chains, by-catch species, threatened species and encompassing ecosystems. However, NT fishing bag limits help to reduce the amount that recreational anglers can take.

Future coastal planning and decision making should ensure the improvement of processes for gathering and sharing information and resources about cross jurisdictional population and long term demographic trends including tourism and visitation patterns. This will assist in preparing for long term population challenges on the coastal zone.

To better integrate population trends into coastal zone planning and management, the Australian Government should co-ordinate and share national research and information available about population change and long term demographic trends in coastal areas in a format which can be used by territory, regional and local planners. Commonwealth development of such a project will ensure nationally consistent and integrated coastal zone information.

⁴ Australian Government, Australian Institute of Marine Science, *Water Quality Monitoring Project: Darwin Harbour*, Can be found at <http://www.aims.gov.au/pages/research/darwin/dhwqmp/dhwq-005.html>.

Planning of future development in the coastal zone in anticipation of sea level rise can reduce the costs of climate change by enabling gradual retreat from advancing shorelines rather than inundation of occupied land. Successful implementation of such adaptive responses necessitates, however, extensive public education about climate change and its consequences.

5. Climate Change in coastal areas

5.1 The impact of climate change on coastal areas

Low profile coasts, shallow continental shelves and macro tidal conditions mean that the Northern Territory (NT) coastal and marine environments are particularly vulnerable to the impacts of climate change. By year 2100, the global sea level is projected to rise by between 18 and 59 cm.⁵ Such a rise in sea levels is expected to increase the salinity of coastal ground waters as aquifers are affected by salt water intrusion. As freshwater resources become more scarce, competition for water between NT towns, agriculture and environmental requirements may increase.

Water quality in the Northern Territory may also be affected due to increased soil erosion and higher temperatures. Furthermore, the wetland system of Kakadu depends on a finely balanced interaction between freshwater and marine environments. In certain areas, the natural levees that act as a barrier between Kakadu's freshwater and saltwater systems are only 20cm high. Sea level rises of another 59cm by 2100⁶ would adversely affect 90 percent of the Kakadu wetland system.

The causes of saltwater intrusion in the NT are not clearly elucidated but are likely to have resulted from a combination of factors including the impact of feral water buffalo, destruction of off shore shoals (sandy elevations in marine environments) and changing land management practices. It is expected that climate change and sea level rise will exacerbate these changes and potentially lead to the destruction of many freshwater wetlands.

Thus, many of the NT wetlands including the Blyth / Liverpool wetlands and the Alligator Rivers Region are under threat of both sea level rise and saltwater intrusion. Natural, cultural, social and economic resources across NT wetlands may be adversely affected by climatic changes over the long term. Specifically, sea level rise, shoreline erosion and saltwater intrusion may degrade both the salt and freshwater wetlands.

⁵ Garnaut, R. *The Garnaut Climate Change Review* (Cambridge University Press, 2008) p. 126.

⁶ Garnaut, R. *The Garnaut Climate Change Review* (Cambridge University Press, 2008) pp. 75-96.

This would be manifested within a:

- reduction or loss of some components of the mangrove fringe on the coast line
- extensive loss of *Melaleuca* (paperbark trees) which stands on the margins of some wetlands
- colonisation of mangrove species along creek lines as an accompaniment to salt water intrusion, and
- replacement of freshwater wetlands with saline mudflats.

With changes in the wetland plant communities and habitats there may also be changes in animal populations. Particularly noticeable would be changes to the community composition and distribution of bird species found in the freshwater wetlands. For example, recent research indicates that in northern Australia, using CSIRO climate change projections to 2030 and 2070, barramundi, prawn and mud crab catches may be adversely impacted by changes in rainfall.⁷ Additionally, there would be changes in the morphology of the streams and billabongs and in the composition of fish and other aquatic species. However, detailed analyses of habitat species interactions have not yet been undertaken. Such changes in the natural vegetation and faunal resources are likely to have cultural, social and economic consequences for Indigenous and non Indigenous people living in or visiting the area.

Additionally, rising temperatures have the potential to damage a wide array of the Northern Territory's fragile ecosystems, particularly the mangrove and estuarine environments. Distributions of pest species and weeds may vary as changes in temperature and water availability make different areas suitable for these species to thrive in. Moreover, specific impacts of rising temperatures also exist, specifically issues arising from sex determination of marine reptiles, particularly turtles. Turtle eggs require temperature ranges between 25°C and 34°C for the optimum ratio of males and females; increasing temperature may result in reduced survivorship and / or a shift in nesting locations. Similarly, crocodiles, a significant cultural icon of the Northern Territory, possess a temperature dependent sex determination.

⁷ Hobday, A. J., Poloczanska, E. S. and R. J. Matear (ed.) (2008), *Climate Impacts on Australian Fisheries and Aquaculture: Implications for the Effects of Climate Change, draft report to the Australian Government Department of Climate Change, Canberra.*

Coral reefs are under threat of bleaching also due to increases in average water temperatures and higher carbon dioxide levels. In the NT a damaging coral bleaching event was recorded at Cobourg Marine Park in November 2002 resulting in the death of approximately 90 percent of the recorded corals (mostly in the Acroporidae Family). The Cobourg Marine Park Plan of Management suggested that the bleaching was a combined result of environmental and anthropogenic stresses.⁸ Coral bleaching occurs when corals experience extreme stress (such as high water temperatures) and expel their algae.

In response, monitoring and surveying of coral reefs is a matter of priority in the Cobourg Marine Park. As such, approximately ten percent of the coral communities in the Cobourg Marine Park will be zoned for conservation. Ongoing sustainable management and conservation of coral habitats will require broad scale mapping, long term monitoring programs and partnerships with local communities and sea ranger groups.

Other likely implications of climate change for the marine environment include, but are not limited to:

- loss, degradation of habitat or changes in species distribution and density
- changes in ocean currents, upwellings and productivity
- displacement, distributional and abundance changes of marine species
- phenological changes (e.g. changes in timing of migration, spawning or other climate related responses)
- lower ocean productivity and disrupted/changed food chains, and
- ocean acidification (changing the ability of calcium carbonate producing organisms to construct shells).

⁸ Cobourg Peninsula Sanctuary and Marine Park Board and Parks and Wildlife Service of the Northern Territory Department of Natural Resources, Environment and the Arts (2007) *Cobourg Marine Park Plan of Management*, <http://www.nt.gov.au/nreta/parks/manage/plans/pdf/ccobourgmarinepark.pdf>.

In addition to potential environmental impacts, a multitude of possible effects exist for housing, health, local and regional economies, infrastructure and industries (including agriculture, fishing, natural resource based tourism and mining). Projected rises in sea level, cyclone intensity and storm surges places coastal towns and communities at an increased risk of flooding, erosion and storm damage.

Further, Indigenous cultural practices and sites could be affected if traditional hunting grounds and sacred sites are submerged. The impacts on remote Indigenous communities which are reliant on coastal regions for food supplies and culture sustaining activities may be significant. Remote communities already have substantially higher food and energy costs than mainstream demographics. Thus, potential adverse ramifications exist for remote communities in adaptation to climate change.

5.2 Strategies to deal with climate change adaptation, particularly in response to projected sea level rise

The Northern Territory (NT) Government has a role to ensure appropriate infrastructure planning to mitigate and adapt to climate change in coastal communities. The future development of Darwin and other coastal communities in the NT will need to take into consideration potential climate change impacts to ensure that infrastructure and developments do not adversely impact on the coastal and marine environments.

Consequently, there is a need to identify specific climate change impacts for coastal areas of the NT, including potential physical, economic, and social changes to inform the management of current infrastructure in the NT and infrastructure planning to limit environmental impacts. The distributed populations along the NT coastline highlight the importance of transport and communication infrastructure to link and service communities.

Through a partnership agreement with the NT Government, Charles Darwin University's School for Environmental Research has a series of active research programs under the theme of Livelihoods and Policy Research. This research includes participatory modelling techniques to explore future options and strategies to manage social-ecological systems, adapt to changing landscapes, and examine the trade-offs between economic development and the conservation of nature. The research focus also examines the implications of climate change on social, economic, and natural capital.

Notwithstanding the Northern Territory's local research programs, there remains a lack of data on the physical nature of the NT coastline and inshore hydrodynamic processes and also, the extent and biological condition of the NT's coastal and marine habitats. This is a major constraint in the prediction and assessment of coastal climate change impacts in the NT and the development of coastal climate change adaptation strategies and plans.

A national approach to acquiring and developing long term data series is required for monitoring for Australia's coastal and marine environments. New remote sensing technologies for surface waters (satellite sensors), shallow waters (LIDAR) and deeper waters (multi beam swath bathymetry, remotely operated and autonomous underwater vehicles - ROV and AUV) offer significant opportunities for monitoring remote coastal and

marine environments, particularly in the NT. While the recent Integrated Marine Observing System (IMOS) funded by the National Collaborative Research Infrastructure Strategy (NCRIS) provides one national approach to acquiring and developing these technologies, the Northern Territory to date has received little of the proposed national infrastructure and investment associated with IMOS. Significant infrastructure investment is required in the NT (and the whole of the northern Australia) to be effective in mitigating and adapting to the impacts of climate change.

The following actions are urgently needed to support the development of coastal climate change adaptation strategies in the NT:

- develop a targeted strategy to address key gaps in knowledge of coastal and marine habitats and biodiversity in the NT
- develop a targeted strategy to improve access and sharing of knowledge and local, regional, national data among non-indigenous (i.e. government, research, community, industry) and indigenous stakeholders
- improve the understanding of the vulnerability of coastal and marine biodiversity to climate change focussing on ecosystems and species that are at particular risk
- identify and develop appropriate, cost effective coastal climate change monitoring and assessment tools, particularly remote sensing and predictive scenario modelling tools to assist coastal managers to predict and evaluate climate change impacts, and
- work toward a nationally consistent marine and coastal biodiversity and fisheries monitoring, reporting and regional / national database and information system with baseline / reference sites in and out of marine protected areas.

Further, the management of coastal climate change impacts in the NT will be significantly assisted through:

- developing regional coastal marine climate adaptation plans that identify climate risks and vulnerabilities and also marine management scenarios and adaptations for coastal marine industries and activities
- integrating knowledge of regional climate change risks and vulnerability into bioregional planning, sea country planning and decision making processes
- supporting NT Government agencies to train and assist indigenous communities to understand, monitor and manage coastal climate change impacts
- supporting NT coastal partnerships and coastal programs, particularly on 'sea country' or indigenous lands, and
- developing a national governance framework to assess and review the integration of current understanding of climate change into coastal management frameworks and directions.

The following 'off reserve' coastal marine habitat management strategies and actions (identified in '*A National Approach to Addressing Marine Biodiversity Decline*'), would also assist significantly in developing regional coastal climate change adaptation strategies and plans in the NT (and nationally):

- **Generalised coastal marine habitat community's classification systems**
Coastal marine habitat biodiversity assessments, monitoring and reporting are currently hindered by the lack of a national classification of coastal marine habitats and communities. This work should build on existing classification efforts (i.e. *Integrated Marine and Coastal Regionalisation of Australia 2006* and other relevant marine biogeographical studies) and coordinate with current state of the environment and NRM monitoring and evaluation monitoring and reporting processes.
- **Standardised coastal mapping, reporting, monitoring, databases**
Species and habitat mapping and coastal monitoring in Australia is currently undertaken by various Natural Resource Management (NRM), government, and university groups. There are currently no nationally consistent reporting and monitoring standards or protocols and significantly, no national databases to assess the status and condition of coastal species or habitats in Australia; this includes ecologically significant coastal habitats and wetlands (i.e. seagrasses, mangroves, salt marshes, reefs) and also, migratory and protected species and

wildlife such as turtles, dugongs, cetaceans, sharks and rays, seabirds and shorebirds.

- **Development approvals and assessment guidelines for coastal and marine habitats**

The direct and indirect impacts of developments on coastal and marine habitats (e.g. seagrasses, mangroves, salt marshes) and their biodiversity are assessed and managed differently across jurisdictions and agencies. Identical habitats and communities can be subjected to rigorous development assessment and approvals processes in one jurisdiction without any effective management in another jurisdiction.

- **'Off reserve' management plans**

'Off reserve' management plans that recognise the full range of biodiversity impacts and provide guidance on how to engage industry in reducing impacts and offsetting losses would be a valuable instrument in coastal and marine habitat management.

- **Habitat protection and management plans**

Like protected species, coastal marine habitats in Australia would benefit from a national approach to habitat identification, valuation and management, including the development of habitat management plans, which include prioritised actions and research priorities.

- **Identification of rare and threatened coastal marine habitats, communities and key processes threatening Australia's coastal marine habitats**

Both on a national and regional basis, very little work has been undertaken to assess the conservation status of Australia's marine habitats / communities.

Projected changes in the climate may affect natural systems and human settlements. The NT Government has recognised the need to 'anticipate, plan and respond to the impact of climate change' in its research priorities for 2008 - 2015.⁹ For coastal management to be most effective it is increasingly necessary to ensure dialogue and cooperation between the technical, scientific and policy making bodies, as well as between governments at all levels and community groups that share responsibility for coastal management. Early studies, such as the Integrated Assessment of Climate

⁹ Northern Territory Government (2007) *Backing Territory Research: Research Priorities for the Northern Territory 2008 – 2015*. Available at: <http://www.nt.gov.au/business/documents/general/Final%20Research%20Priorities%20Report%202008%20-2015.pdf>

Change Impacts on Urban Settlements (IACCIUS)¹⁰, and the National Coastal Vulnerability Assessment - Kakadu Case Study, are acknowledged, noting that the analysis and interpretation is still at an early stage and will become more robust over time.

There is a need to develop expertise in managing remote coastal areas that are affected by natural and anthropogenic causes. Further, improved understanding of the scale and range of potential impacts to the natural and built coastal environment is needed in order to develop and implement appropriate response strategies.

The NT coastal environment necessitates management strategies that recognise Indigenous cultural interests and issues. Indigenous people have a unique and enduring connection with the sea and a multitude of benefits exists in developing complementary and cooperative marine research, monitoring and planning among Indigenous groups, governments at all levels, and the NT community.

In correlation with the Marine Biodiversity Report (2008),¹¹ the improvement in the management of climate change impacts on marine biodiversity may be undertaken through:

- developing regional marine climate adaptation plans that identify climate risks and vulnerabilities and also marine management scenarios and adaptations for marine industries and activities
- integrate knowledge of regional climate change risks and vulnerability into bioregional planning and decision making processes, and
- developing a national governance framework to assess and review the integration of current understanding of climate change into coastal management frameworks and directions.

¹⁰ Refer to Li, G. (2007). *Approaching Integrated Assessment of Climate Change Impacts on Urban Settlements*. State of Australian Cities Conference. Adelaide, 28-30 November 2007 and Dovers, S. (2007). *Still settling cities: sustainability, governance and change*. State of Australian Cities Conference. Adelaide, 28-30 November 2007.

¹¹ Marine Biodiversity Decline Working Group, *A National Approach to Addressing Marine Biodiversity Decline* – Report to the Natural Resource Management Ministerial Council, April 2008

These goals align with the *Australian Climate Change Science: A National Framework's Coasts and Oceans* policy which states that the major challenge is to manage the multiple uses of coastal and marine environments in a manner that acknowledges the risks and minimises the consequences of climate change.¹²

¹² Australian Government Department of Climate Change, *Australian Climate Change Science: A National Framework Exposure Draft* (October 2008) can be found at:

6. Mechanisms to promote sustainable coastal communities

Importantly, long term, coastal partnerships, particularly between government agencies and indigenous communities are essential for the success of any coastal climate change research, training, monitoring and management programs in the Northern Territory (NT). NT Government agencies already have a range of medium to long term, 'on-the-ground' coastal partnership programs with several indigenous communities and sea rangers groups (i.e. Indigenous Protected Areas, debris, pests, turtles, dugongs, habitat mapping).

Many of these coastal programs are supported through short term, Commonwealth grants (National Heritage Trust (NHT), Natural Resource Management (NRM), Community Development Employment Projects (CDEP)). With adequate long term, resourcing these coastal programs could be expanded to include coastal climate change research, monitoring, training, education, planning and management in the NT.

It is critical to review and evaluate existing Commonwealth funded coastal programs in the NT – across all Commonwealth portfolios – to remove overlaps and ensure integration of coastal research, monitoring, reporting and management activities. The Commonwealth needs to recognise and importantly, support ongoing coastal programs by Northern Territory government agencies – and particularly the successful, 'on-the-ground' long term coastal partnerships and training programs with Indigenous communities. This includes review and examination of current Commonwealth funding guidelines for NRM and NHT, to specifically promote and support NT Government – Indigenous partnership projects.

Lack of data and access to data remain major constraints to coastal climate change monitoring and evaluation in the NT. In particular, data from Commonwealth funded coastal programs (e.g. NHT, NRM) is often difficult to access. Data sharing and the lodgement of all data (onto nominated national databases) should be a compulsory requirement of all Commonwealth grants.

The Department of Natural Resources, Environment, the Arts and Sport (NRETAS) has capability and strengths in coastal marine biodiversity, datasets and changes to mangroves and other coastal habitats. The Department is currently constructing a \$600,000 online or web based marine and coastal Atlas. Using national metadata standards, the Atlas aims to improve accessibility of coastal and marine information by collating and standardising existing information. The project also aims to identify information gaps on the condition and extent of NT coastal marine assets and identify priority areas, habitats and species for long term monitoring. Significantly, this web based atlas requires population with datasets from non government agencies / organisations (industry, indigenous, communities, and researchers). This process would be assisted through Commonwealth grants requiring formal lodgement of data onto this important regional database.

The *NT Environmental Impact Assessment Guide: Greenhouse Gas Emissions and Climate Change* is used by the NT Government for assessment of developments under the *Environmental Assessment Act*. The Guide requires developers to discuss how projected climate change has been taken into account in planning, how climate change is expected to affect the development over its stated lifetime, and how climate change related risks will be managed.¹³

¹³ <http://www.nt.gov.au/nreta/environment/greenhouse/publications.html>

7. Governance and institutional arrangements for the coastal zone

National governance frameworks are essential to implementing a cross jurisdictional and national approach to coastal management and particularly, climate change. Across jurisdictional boundaries it is an ongoing challenge to ensure that conservation objectives are complementary and that planning and management activities are coordinated. Inter governmental relationships need to be communicative and proactive in ensuring complementary 'on ground' actions. Government, industry and non government organisations (NGOs) need to be working together to make the most of common coastal climate change interests and requirements.

To this, the following actions are required:

- Foster collaborative relationships amongst jurisdictions to ensure complementary responses to the coastal climate change
- Review national coordination across jurisdictions of responses to coastal climate change and adaptation
- Progress the integrated management of the coastal zone including monitoring coastal climate change.

Importantly, in light of the recent landmark Blue Mud Bay decision, Indigenous stakeholders as significant land managers (particularly in northern Australia), need to be included in all aspects of national coordination, development and implementation of coastal climate change policies, strategies and plans.

Integrated coastal zone management (or ICZM) remains a major challenge for all jurisdictions in Australia. As such, Australia's current response to coastal climate change will be significantly undermined unless the challenge of ICZM is also addressed. To this it is worth noting while the *National Cooperative Approach to ICZM* (NRMC 2006) identified coastal climate change as a high priority issue requiring national collaboration, the process came with no formal work program or funding.

In many respects there is a need for stronger national leadership on coastal management, particularly if the challenge of climate change is to be addressed effectively. Current institutional and national cooperative frameworks for the environment

- particularly on water quality, protected species, migratory wildlife, fisheries and habitat management - need to be reviewed to ensure a national, coordinated and cost effective approach to coastal management. In this respect, the Marine and Coastal Committee (MACC) of the Natural Resource Management Standing Committee (NRMSC) and the Natural Resource Management Ministerial Council (NRMMC) needs to play a much stronger role in reviewing and defining current national cooperative frameworks to ensure more effective national approach to coastal management and coastal climate change.

When national cooperative frameworks, strategies and plans do exist, they need to be adequately resourced - if State/Territory agencies are to implement national plans. For instance, approximately \$7 million has been spent on marine turtle conservation in Australia over the past 5 years. Of this, however, only \$100K per year has been allocated through the national turtle recovery group – addressing national priorities for turtle conservation, recovery and management. This is just one example of how local environmental priorities in Australia are often funded at the expense of national priorities. To this end, Commonwealth funding and delivery mechanisms urgently need to be reviewed – especially the links between NRM, NHT and recurrent Commonwealth funding for biodiversity (wildlife, protected species, migratory species), environment (water quality, pests), marine resources (fisheries, aquaculture) and indigenous development and capacity building – to ensure that national priorities (not local priorities) are being met and ensure integration and alignment of programs (and reduce overlap).

The Northern Territory Government supports the Australian Commonwealth Governments' Department of Climate Change in its suggestion that effective management of the coastal zone requires that those developing or making policy decisions in coastal areas have access to diverse types of information including social, cultural, economic, ecological, biophysical and geophysical information and data. Coastal zone information and data, however, remains limited, particularly the status of many coastal species and habitats. Research efforts that contribute to our understanding of coastal environments benefit from coordination and monitoring to ensure that priority areas are being addressed and that coastal management needs are being met.

Adaptive management relies on dependable information being available to policy makers and managers for initial decision making and for review and adaptation of management responses. This may be undertaken via the formation of cross disciplinary working groups organised by theme and with a specific mandate.

Capacity building is also necessary whereby co-operation between governments, universities and research institutions should be promoted and an assessment of coastal priorities to direct future data collection and research is undertaken. Such cross disciplinary work is already being undertaken through Griffith University under the National Climate Change Adaptation Research Facility that is developing practical tools to respond to the impacts of climate change. Northern Territory stakeholders, including NT research organisations such as the Charles Darwin University need to be fully incorporated into this forum, even if the Territory is not formally represented in all the themes.

Currently, many coastal issues are dealt with on a state / territory basis rather than in an integrated, intergovernmental and cross sectoral manner. However, environmental change is manifest across the biophysical region irrespective of jurisdictional boundaries. Governmental structures and community based management mechanisms need to provide a consistent and appropriate response for coastal ecosystem management. Currently, such nation wide change is occurring for the better. In correlation to the *National Framework on Climate Change* the diabolical problem of climate change requires a coordinated national response that will deliver the science needed for the future health and productivity of our nation.

8. Attachments

Attachment A: International Treaties and Conventions

Attachment B: Legislation Relevant to the NT Coastal Zone

Attachment C: Northern Territory Coastal Communities Map

Attachment A

International Treaties and Conventions

(Treaties and Conventions relevant to NT coastal environments)

- Convention on Wetlands of International Importance (RAMSAR Convention) 1971
- UNESCO Convention Concerning the Protection of World Cultural and Natural Heritage 1972
- International Convention of Prevention of Marine Pollution by Dumping from Ships and Aircraft 1972
- Convention on International Trade of Endangered Species of Wild Flora and Fauna (CITES) 1973
- International Convention for the Prevention of Pollution from Ships (MARPOL) 1973/1978
- Japan Australia Migratory Bird Agreement (JAMBA) 1974
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979
- United Nations Convention on the Law of the Sea (UNCLOS) 1982
- China Australia Migratory Bird Agreement (CAMBA)
- Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP) 1986 and two related protocols:
 - SPREP Protocol Concerning Co-operation in Combating Pollution Emergencies in the South Pacific Region 1986
 - SPREP Protocol for the Prevention of Pollution of the South Pacific Region by Dumping
- Convention on Biological Diversity 1992
- United Nations Framework Convention on Climate Change 1992

Attachment B

Legislation Relevant to the NT Coastal Zone

Conservation

- *National Parks and Wildlife Conservation Act 1975 (Cth)*
- *Historic Shipwreck Act 1976 (Cth)*
- *Environmental Protection (Alligator Rivers Region) Act 1978 (Cth)*
- *Environmental Protection (Northern Territory Supreme Court) Act 1978 (Cth)*
- *Conservation Commission Act 1980 (NT)*
- *Soil Conservation and Land Utilisation Act 1980 (NT)*
- *Noxious Weed Act 1980 (NT)*
- *Coburg Peninsula Aboriginal Land and Sanctuary Act 1981 (NT)*
- *Environmental Assessment Act 1982 (NT)*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)*
- *Protection of Moveable Cultural Heritage Act 1986 (Cth)*
- *Territory Parks and Wildlife Act 1988 (NT)*
- *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)*
- *Heritage Conservation Act 1991 (NT)*
- *Water Act 1992 (NT)*
- *Intergovernmental Agreement on the Environment 1992*
- *Environmental Protection and Biodiversity Act 1999 (Cth)*

Land Use

- By laws of the Municipality of Darwin
- *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)*
- *Aboriginal Land Act 1978 (NT)*
- *Local Government Act 1990 (NT)*
- *Crowns Land Act 1992 (NT)*
- *Planning Act 1999 (NT)*

Industry

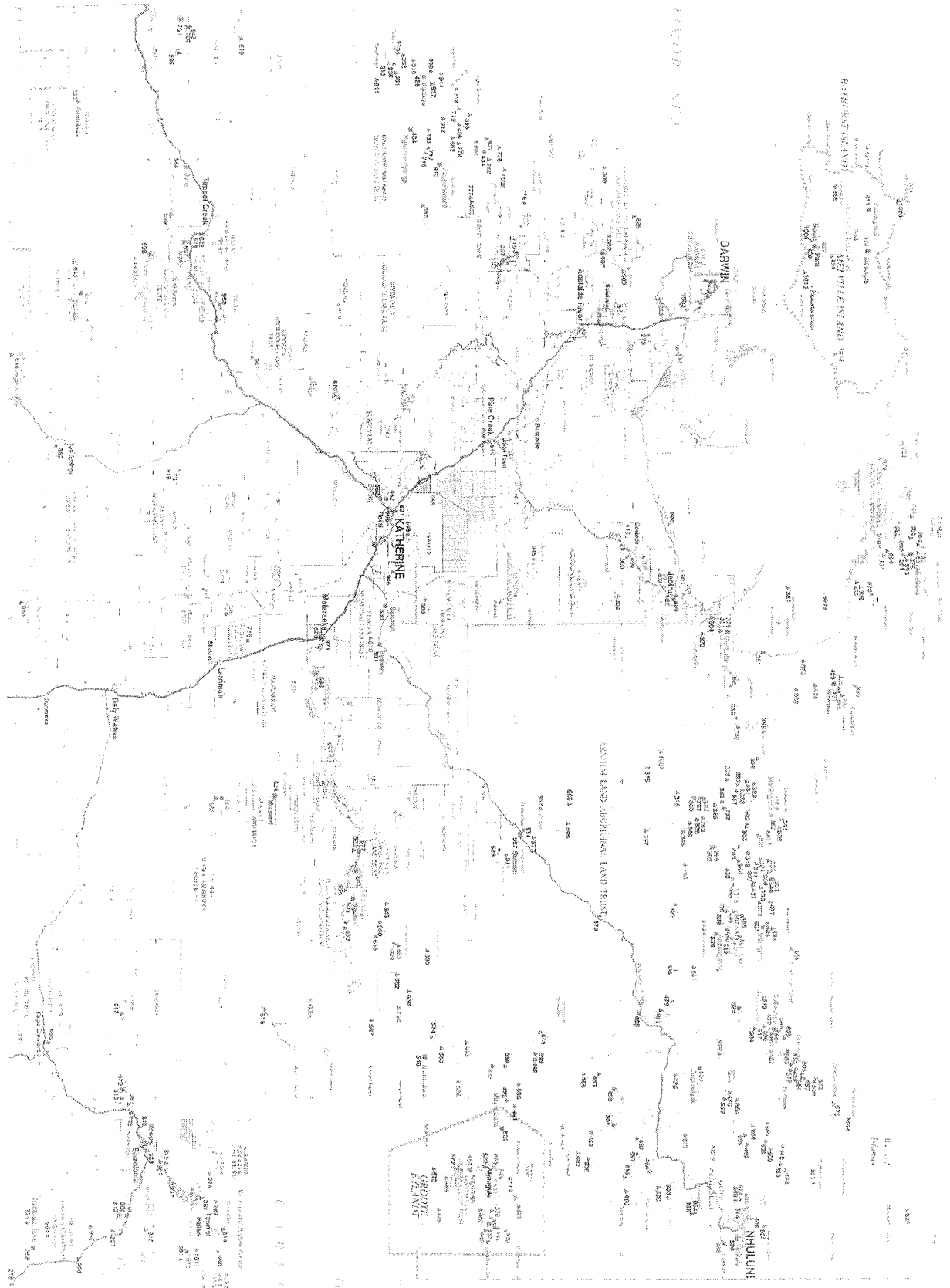
- *Navigations Act 1912 (Cth)*
- *Mining Ordinance (Gove Peninsula Nabalco Agreement) 1968*
- *Northern Territory Tourist Commission Act 1979 (NT)*
- *Marine Act 1981 (NT)*
- *Mining Act 1982 (NT)*
- *Petroleum (Submerged Lands) Act 1982 (NT)*
- *Petroleum Act 1984 (NT)*
- *Darwin Port Authority Act 1983 (NT)*
- *Offshore Waters (Application of Territory Laws) Act 1985 (NT)*
- *Fisheries Act 1988 (NT)*
- *Pastoral Lands Act 1992 (NT)*

Pollution Control and Waste Management

- *Prevention of Pollution of Waters by Oil Act 1962 (NT)*
- *Dangerous Goods Act 1981 (NT)*
- *Waste Management and Pollution Control Act 1998 (NT)*

Attachment C

Northern Territory Coastal Communities Map



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